

# Evaluation of Nonsteroidal Anti-Inflammatory Drugs (NSAIDs) (Lab 4)

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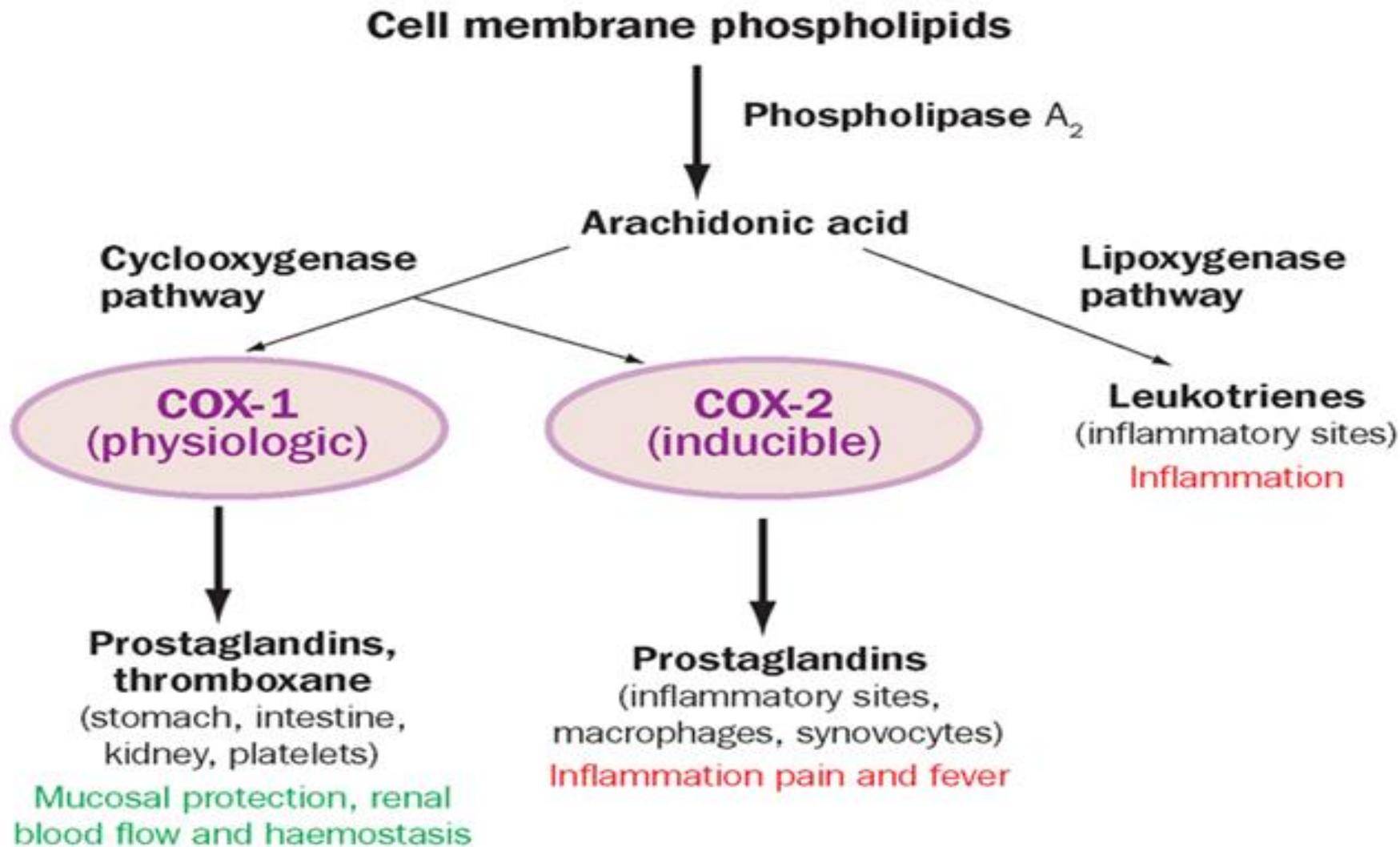


## Nonsteroidal Anti-Inflammatory Drugs (NSAIDs):

- The NSAIDs are a group of chemically dissimilar agents that differ in their antipyretic, analgesic, & anti-inflammatory activities.
- They act primarily by inhibiting the cyclooxygenase (COX) enzymes that catalyze the first step in prostanoid biosynthesis. This leads to decreased prostaglandin synthesis with both beneficial & unwanted effects.
- Traditional NSAIDs include aspirin, ibuprofen, naproxen & many other generic & brand name drugs.

- A newer NSAID like celecoxib, is a "COX-2 inhibitor" or a "COX-2 selective" NSAID.
- NSAIDs are used to relieve pain & reduce signs of inflammation.
- NSAIDs also are a common treatment for chronic (long-term) health problems such as rheumatoid arthritis & osteoarthritis.

# Synthesis of prostaglandins & leukotrienes:



## **General unwanted effects of NSAIDs:**

- Dyspepsia, nausea & vomiting. Gastric damage may occur in chronic users, with risk of haemorrhage.
- Skin reactions.
- Reversible renal insufficiency seen mainly in individuals with compromised renal function.
- All NSAIDs (except COX-2 inhibitors) prevent platelet aggregation & therefore may prolong bleeding.

## In vivo analgesic evaluation techniques:

### ❖ Principle:

Pain is induced in a suitable animal & the response of the animal to the painful stimuli is recorded with or without administration of the analgesic agent.

### ❖ Classification of methods:

#### 1. Methods for central analgesic activity:

- Hot plate method
- Tail immersion method
- Tail clip method

#### 2. Method for peripheral analgesic activity:

- Writhing method
- Formalin test in rats

## Writhing method:

- The painful stimulus is induced by IP injection of an irritant substance (e.g. acetic acid).
- The animals create a characteristic **stretching behavior**, which is called writhing. (writhing is **constriction of abdomen, turning of trunk (twist) & extension of hind legs**).
- The number of writhes for each animal is counted during certain time period (eg, during 30 minutes), beginning 5 minutes after injection of acetic acid.

## Experimental protocol:

- Groups of animals are the control & the treated mice.
- The control group is given acetic acid IP & after 5 minutes the number of writhes is recorded for each animal during 30 minutes.
- Treated animals are administered the drug (diclofenac or piroxicam) IP, 30 minutes prior to acetic acid administration. Then acetic acid is given IP.
- Five minutes are allowed to elapse, the mice are then observed for a period of 30 minutes & the number of writhes is recorded for each animal.

- If the drug possesses analgesic activity, the animal that received the drug will give lower number of writhes than the control, i.e. the drug having analgesic activity that inhibits writhing.

- Calculate % inhibition:

$$\% \text{ inhibition} = \frac{[\text{No. of writhing in control group} - \text{No. of writhing in treated group}]}{\text{No. of writhing in control group}} \times 100$$

**THANK YOU FOR YOUR  
ATTENTION**